



On-demand heating - Grundfos iGRID Hydronic Balancing A new way to guard blue sky and warm houses in Zhengzhou

Zhengzhou is known as the "Green City" in China. It has four distinct seasons with winters cold and dry. Heating is thus an important livelihood project every winter. In 2017, Zhengzhou was successfully selected as a pilot city for winter heating with clean energy sources by the central government. While adding cleaner and more diverse energy sources to its heating energy mix, it is also actively exploring new ways to increase energy efficiency and lower carbon emissions of the existing central heating projects to better curb air pollution.

Challenges in Traditional Secondary Heating Systems

District heating is a widely used method in Zhengzhou, as is seen in a neighborhood located in the city's Zhongyuan District. This established neighborhood consists of five blocks and nine units, and each unit is divided into two areas: higher floor area and lower floor area. The neighborhood takes up an area of 140,000 square meters, with a total of 1,594 households.

In 2016, the company providing heating to the neighborhood carried out an energy-saving project and replaced the large circulator pumps in the sub-station with smaller pumps. However, a 2020 review revealed that this sub-station's energy consumption was still higher than other stations operated by the same company, with an average power consumption of about 1 kWh/m² per heating season, necessitating further investigation and troubleshooting.

Upon consultation with the heating company, Grundfos learned that despite the high energy consumption, the residents in the neighborhood still complained about not having comfortable room temperature at home. Meanwhile, the heating company had to allocate significant resources in operation and maintenance of the station. Finding a way to reduce energy consumption while providing satisfying heating experience to the residents was a big challenge for the heating company.

Power Energy Saving

45%

Thermal Energy Saving

18%

On-demand heating results in a 50% reduction in energy consumption while improving heating comfort

After in-depth research on the project and rounds of discussions with the heating company, Grundfos proposed an innovative demand driven solution that could regulate speed and pressure based on fluctuating heating demand. The solution enables staff to monitor the operation of the circulator pumps in the sub-station and the whole system. As a result, energy consumption could be significantly reduced while every household could enjoy optimal heating comfort.

Leveraging its proprietary hydraulic design software, Grundfos simulated the hydraulic conditions of the entire water system and selected the most suitable pumps for this project. By installing the European-patented Grundfos MAGNA3 circulator pump at the entrance of each unit, every unit was transformed into an independent circulation loop. The European-patented[®] Grundfos MAGNA3 circulator pump has a built-in microprocessor that can not only control the return pipe temperature of the dedicated circulating loop,

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Possibility in every drop

but also provide the required head and flow for the respective circulating loops. At the same time, the source pump in the sub-station is synchronized with the zone pump via Grundfos' proprietary controller and algorithm, ensuring that the distribution system achieves a balance between supply and demand, therefore leading to higher operational efficiency and lower energy consumption.



Source pump

MAGNA 3

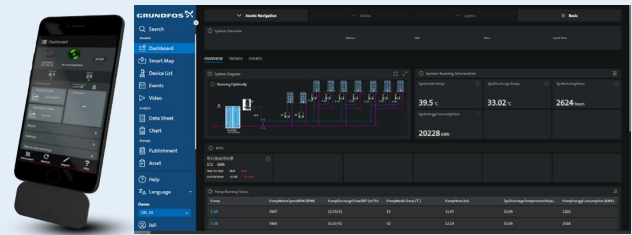
Controller

With the new design, the two source pumps at the heating exchange station are only responsible for the water circulation within the station, without having to accommodate the differed heating demand between blocks closer to the station and those farther away. As a result, the required power of the pumps was greatly reduced compared with the traditional method, with two 7.5kW pumps replacing the original two pumps of 15kW and 18.5kW, respectively. The specifications and power distribution requirements of the pumps were also simplified accordingly.

With this innovative solution, Grundfos has successfully extended the energy-saving potential from a pump-level to a system-level. It not only reduces the energy consumption of the source pumps, but also ensures accurate transmission of heat according to the actual demand of each unit, improving end user's comfort while avoiding waste. After running for 2 year heating season, power energy saving achieved by 45%, thermal energy saving achieved by 18%, leading to lower power bills and operating costs.

Initial feedback of the trial was very positive. The residents' heating experience has been significantly improved – for residents living farther away from the heating exchange station, room temperature can stay above 20°C. Thanks to the low noise level of MAGNA3, there has been no impact on the residents despite being installed closer to their homes.

At the same time, the installation and adjustment of the Grundfos MAGNA3 circulator pump is very convenient, with the Bluetooth interface enabling setting and checking report through Apps. This project is also equipped with the Grundfos iSolutions Suite, a digital platform that allows staff to further optimize the operation through real-time monitoring and data analysis of the pump system.



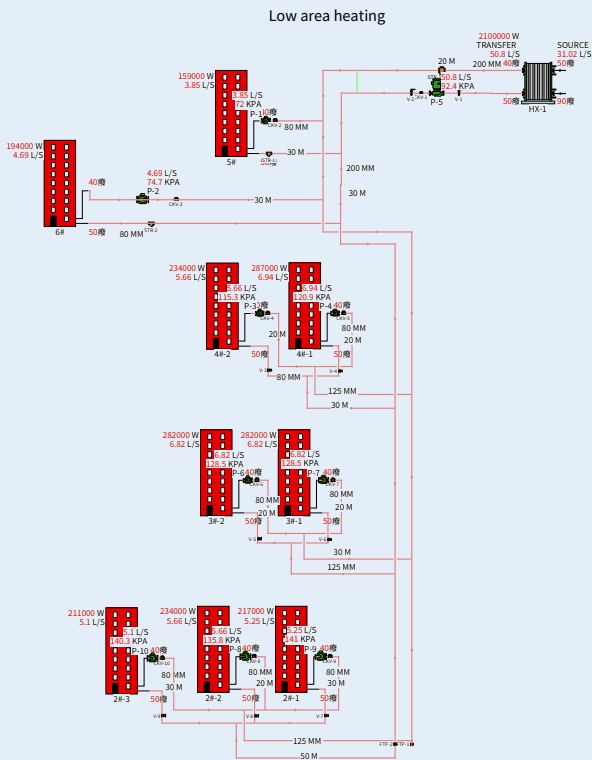
Grundfos iSolutions Suite

On November 15, 2021, with the start of the heating season in Zhengzhou, the new Grundfos iGRID hydronic balancing solution officially started its trial operation, which brings the innovation idea for China district heating system with higher energy efficiency, improved indoor comfort.

"Carbon emissions from building operations account for about 20% of China's total carbon emissions, and when including building materials and construction, the figure is close to 40%."

Xu Wei, chief engineer of the China Academy of Building Research, said in a recent interview with China Central Television (CCTV) ^②

Among them, heating in northern China consumes 212 million tons of standard coal with carbon emissions of about 550 million tons^③. The heating sector has a big role to play as China pushes through its goal of carbon neutrality by 2060. A shift from centralized heating to on-demand heating represents huge potential in reducing energy consumption and carbon emissions, all while improving heating comfort.



Grundfos iGRID hydronic balancing solution

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- ① Patent name: FLOW CONTROL MODULE AND METHOD FOR CONTROLLING THE FLOW IN A HYDRONIC SYSTEM
- ② Ultra-low-energy buildings help accelerate the development of "carbon neutral" buildings for the Green Winter Olympics (baidu.com), People's Daily, January 27, 2022
- ③ Emitting 1 billion tons of carbon dioxide a year, heating renovation is urgent, People's Daily, February 7, 2021

